SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)
SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

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DEPARTMENT OF MEDICAL ELECTRONICS

QUESTION BANK

VII SEMESTER

1906704 DIGITAL IMAGE PROCESSING

(Common to VII Semester Medical Electronics)

Regulation – 2019

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DEPARTMENT OF MEDICAL ELECTRONICS

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SUBJECT   : 1906704 DIGITAL IMAGE PROCESSING

SEM / YEAR: VII/ IV-year B.E.

	UNIT I - DIGITAL IMAGE FUNDAMENTALS			
	Steps in Digital Image Processing – Components – Elements of Visual Perception –Types of Images: Monochrome and Color model, Chromatic diagram, Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - color image fundamentals, RGB, HIS models.			
	PART - A			
Q.No	Questions	CO	BT Level	Competence
1.	List the basic steps in digital image processing.	CO1	BTL1	Remembering
2.	What is the objective of image enhancement?	CO1	BTL2	Understanding
3.	Name any four components of a digital image processing system.	CO1	BTL1	Remembering
4.	What is the role of a digital computer in DIP?	CO1	BTL2	Understanding
5.	Summarize about the brightness and contrast in image perception.	CO1	BTL2	Understanding
6.	What is meant by Weber ratio?	CO1	BTL1	Remembering
7.	Differentiate between monochrome and color images.	CO1	BTL2	Understanding
8.	What is a pseudo-color image?	CO1	BTL1	Remembering
9.	Illustrate the color model with an example.	CO1	BTL2	Understanding
10.	What is the significance of the chromaticity diagram?	CO1	BTL2	Understanding
11.	List the components of the RGB model.	CO1	BTL1	Remembering
12.	List the components of the HSI model.	CO1	BTL1	Remembering
13.	State one key difference between RGB and HSI models.	CO1	BTL2	Understanding
14.	Define hue and saturation in HSI model.	CO1	BTL1	Remembering
15.	Mention the two elements of image acquisition.	CO1	BTL2	Understanding
16.	What is image sensing in DIP?	CO1	BTL1	Remembering
17.	Define image sampling.	CO1	BTL1	Remembering
18.	What is quantization in image processing?	CO1	BTL1	Remembering
19.	Illustrate about bit depth mean in quantization.	CO1	BTL2	Understanding
20.	Define 4-neighbors and 8-neighbors of a pixel.	CO1	BTL1	Remembering
21.	List the color models involved in hardware.	CO1	BTL1	Remembering

22.	Outline the function of an image sensor.		CO1	BTL2	Understanding
23.	Classify the types of image sensing sensors.		CO1	BTL2	Understanding
24.	Mention the applications of image processing.		CO1	BTL2	Understanding

	PART- B				
1.	Explain the fundamental steps involved in digital image processing with a neat block diagram.	(13)	CO1	BTL4	Analyzing
2.	Analyze the components of a typical digital image processing system and explain the role of each component with a neat diagram.	(13)	CO1	BTL4	Analyzing
3.	Explain the elements of visual perception. How does the human visual system influence image processing algorithms?	(13)	CO1	BTL3	Applying
4.	Compare and contrast different types of digital images (monochrome, binary, color, indexed). Give suitable examples.	(13)	CO1	BTL4	Analyzing
5.	Describe the RGB and HSI color models. Also, derive the transformation equations between RGB and HSI.	(13)	CO1	BTL4	Analyzing
6.	What is a chromaticity diagram? Explain how it is used in color representation and interpretation.	(13)	CO1	BTL3	Applying
7.	Explain image sensing and acquisition in detail. Describe different types of sensors used and their working principle.	(13)	CO1	BTL3	Applying
8.	Elaborate in detail on the process of image sampling and quantization. How do sampling rate and quantization level affect image quality?	(13)	CO1	BTL4	Analyzing
9.	Describe the various types of pixel relationships. Explain adjacency, connectivity, region, and boundary with examples.	(13)	CO1	BTL3	Applying
10.	Analyze the basic concepts of image resolution, distance measures, and neighborhood relationships in a digital image.	(13)	CO1	BTL4	Analyzing
11.	i) Write in detail about the image acquisition system. ii) Illustrate how the image is digitized by the sampling and quantization process.	(7) (6)	CO1	BTL4	Analyzing
12.	Describe in detail the various sensors of Image acquisition systems.	(13)	CO1	BTL3	Applying
13.	Explain the principle of operation of the human eye with suitable diagrams.	(13)	CO1	BTL3	Applying
14.	Write short notes on CMY and HSI color models.	(13)	CO1	BTL4	Analyzing
15.	Explain in detail about: i) Image sampling, ii) Quantization.	(7) (6)	CO1	BTL3	Applying
16.	Briefly define the following terms: i) Image restoration, ii) Compression, iii) Segmentation, iv) Morphological processing.	(3) (3) (3) (4)	CO1	BTL3	Applying

17.	Describe the following: i)Monochrome model ii)Color model.	(7) (6)	CO1	BTL 3	Applying

PART - C					
1.	Elaborate in detail on the steps involved in a digital image processing system. Discuss each step with a neat block diagram and its function.	(15)	CO1	BTL4	Analyzing
2.	Explain image sampling and quantization in detail. What are their effects on image resolution and quality? Use diagrams and examples.	(15)	CO1	BTL3	Applying
3.	Elaborate on the normalized plot of the color response CIE 1931 standard with explanations.	(15)	CO1	BTL 4	Analyzing
4.	With suitable diagrams, explain the image sensing and acquisition process. Also, describe the working of any two types of image sensors.	(15)	CO1	BTL3	Applying
5.	Analyze the chromaticity diagram in detail. How is it helpful in representing color information? Discuss any one application.	(15)	CO1	BTL4	Analyzing

UNIT II	IMAGE ENHANCEMENT

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters. Homomorphic filtering, Color image Enhancement.

PART- A				
Q.No	Questions	CO	BT Level	Competence
1.	Outline about the image filtering.	CO2	BTL2	Understanding
2.	What is meant by spatial domain processing in images?	CO2	BTL1	Remembering
3.	List any two gray-level transformation functions.	CO2	BTL1	Remembering
4.	Define contrast stretching.	CO2	BTL1	Remembering
5.	Illustrate the thresholding in the gray-level transformation.	CO2	BTL2	Understanding
6.	Differentiate between linear and nonlinear gray-level transformations.	CO2	BTL2	Understanding
7.	What is a histogram and histogram equalization of an image?	CO2	BTL1	Remembering
8.	State one use of histogram specification.	CO2	BTL1	Remembering
9.	Mention the purpose of histogram stretching.	CO2	BTL2	Understanding
10.	Differentiate between histogram equalization and specification.	CO2	BTL2	Understanding
11.	What is spatial filtering in image processing?	CO2	BTL1	Remembering
12.	Mention the purpose of a sharpening filter.	CO2	BTL2	Understanding
13.	Identify the difference between high-pass and low-pass filters in spatial Domain.	CO2	BTL2	Understanding
14.	Name any two commonly used edge detection filters.	CO2	BTL1	Remembering
15.	What is the purpose of the Fourier Transform in image processing?	CO2	BTL1	Remembering
16.	What is the difference between frequency domain and spatial	CO2	BTL1	Remembering

	domain filtering?			
17.	List any two types of frequency domain filters.	CO2	BTL1	Remembering
18.	Define a Butterworth filter.	CO2	BTL1	Remembering
19.	What is the role of the Gaussian filter in the frequency domain?	CO2	BTL2	Understanding
20.	Summarize the two categories of image enhancement.	CO2	BTL2	Understanding
21.	List various gray-level transformation techniques.	CO2	BTL1	Remembering
22.	Distinguish between smoothing and sharpening filters.	CO2	BTL2	Understanding
23.	Outline the mechanics of spatial filtering.	CO2	BTL2	Understanding
24.	Write a note about homomorphic filtering.	CO2	BTL2	Understanding

	PART – B			
1.	Explain various gray-level transformation functions. Illustrate each with graph and image examples. (13)	CO2	BTL3	Applying
2.	Describe contrast stretching and thresholding techniques in detail with suitable diagrams and applications. (13)	CO2	BTL4	Analyzing
3.	Analyze the working principle of sharpening spatial filters using the Laplacian operator. Include mask examples. (13)	CO2	BTL4	Analyzing
4.	Differentiate between spatial correlation and convolution. Explain each with an identical example. (13)	CO2	BTL4	Analyzing
5.	i) Describe the histogram equalization method of image enhancement. (7) ii)Analyze the histogram specification technique in detail with equations. (6)	CO2	BTL4	Analyzing
6.	From the fundamentals, explain with an example: i) Spatial smoothening (7) ii) Spatial sharpening (6)	CO2	BTL 3	Applying
7.	Explain the Fourier Transform to enhance an image. Show filtering steps in the frequency domain, and list its properties with examples. (13)	CO2	BTL3	Applying
8.	i) Deduce about spatial enhancement techniques and Median filtering. (7) ii) Compare the various image transformation techniques. (6)	CO2	BTL4	Analyzing
9.	i) With an example, explain in detail about spatial averaging. (7) ii) Describe in detail the various types of mean filters. (6)	CO2	BTL3	Applying
10.	Explain the various techniques in the frequency domain to enhance an image with necessary examples. (13)	CO2	BTL3	Applying
11.	Illustrate the 2D Fourier transform and its pair. State and prove their property. (13)	CO2	BTL3	Applying
12.	Explain in detail about i) Spatial and Frequency domain enhancement (13)	CO2	BTL3	Applying

	ii) Discrete Fourier Transform				
13.	Evaluate the performance of Gaussian high-pass filter in sharpening applications. Use frequency domain graphs.	(13)	CO2	BTL4	Analyzing
14.	i)Distinguish between spatial & frequency domain image enhancement ii) Analyze the operations of Ideal, Butterworth, and Gaussian filters for both low-pass and high-pass.	(7) (6)	CO2	BTL4	Analyzing
15.	Describe in detail Homomorphic filtering.	(13)	CO2	BTL3	Applying
16.	With a suitable diagram, explain the process of color image enhancement.	(13)	CO2	BTL3	Applying
17.	i) Explain the sampling theorem in 2D. ii)Write about aliasing in Images.	(7) (6)	CO2	BTL3	Applying

	PART – C				
1.	Describe the constraints of histogram equalization and the technique of histogram processing in detail.	(15)	CO2	BTL4	Analyzing
2.	Analyze the various grey level transformations with examples and plot the graph of the transformation functions.	(15)	CO2	BTL4	Analyzing
3.	Describe the various filters in terms of their performance, accompanied by necessary illustrations.	(15)	CO2	BTL3	Applying
4.	With necessary illustrations, explain the Fourier transform in the frequency domain and the combining sinusoids of frequency content.	(15)	CO2	BTL3	Applying

5.	Write in detail the following:
	   i. Gray level transformation.
	   ii. Color Image enhancement.
		(7)
		(8)
			CO2	BTL3	Applying

UNIT III	IMAGE RESTORATION

Image Restoration - Degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering.

PART A

Q. No	Questions	CO	BT Level	Competence
1.	Identify the factors that contribute to image degradation.	CO3	BTL2	Understanding
2.	Define the degradation model used in image restoration	CO3	BTL1	Remembering
3.	Write the equation for converting the Wiener filter into the inverse filter.	CO3	BTL2	Understanding
4.	Identify the drawback of inverse filtering. How can it be overcome?	CO3	BTL2	Understanding
5.	Why is the restoration called unconstrained restoration?	CO3	BTL2	Understanding
6.	Classify the noise models involved in image restoration.	CO3	BTL2	Understanding
7.	List the various spatial restoration filters.	CO3	BTL1	Remembering
8.	Differentiate between Enhancement and Restoration.	CO3	BTL2	Understanding
9.	State the types of frequency domain restoration filters	CO3	BTL1	Remembering
10.	Write the types of Order statistics filters	CO3	BTL1	Remembering
11.	Mention the three types of image degradation estimation models.	CO3	BTL1	Remembering
12.	Obtain the band-pass filter transfer function from the band-reject filter.	CO3	BTL2	Understanding
13.	Write a note on the Gaussian noise model.	CO3	BTL2	Understanding
14.	Outline about the Rayleigh noise model.	CO3	BTL2	Understanding
15.	How do the arithmetic and geometric mean filters differ?	CO3	BTL2	Understanding
16.	List common types of noise in digital images.	CO3	BTL1	Remembering
17.	What are mean filters?	CO3	BTL1	Remembering
18.	Name two types of mean filters.	CO3	BTL1	Remembering
19.	What is an order-statistics filter? Give an example.	CO3	BTL1	Remembering
20.	When is a median filter preferred over a mean filter?	CO3	BTL2	Understanding
21.	What is an adaptive filter?	CO3	BTL1	Remembering
22.	Differentiate between band-pass and band-reject filters.	CO3	BTL2	Understanding
23.	Define a notch filter.	CO3	BTL1	Remembering
24.	What is optimum notch filtering?	CO3	BTL1	Remembering
	PART – B			
1.	(i) Explain the concept of inverse and pseudo-inverse filters for Image restoration. (ii) Explain in detail the spatial transformation techniques used for image restoration.	(7) (6)	CO3	BTL3	Applying

2.	Derive and explain the mathematical model of image degradation and restoration.	(13)	CO3	BTL3	Applying
3.	Discuss various types of noise models in digital images. Give suitable mathematical representations.	(13)	CO3	BTL4	Analyzing
4.	Explain the working of arithmetic and geometric mean filters with examples.	(13)	CO3	BTL3	Applying
5.	Explain adaptive filters with equations. How do they perform better than standard filters?	(13)	CO3	BTL3	Applying
6.	Design a band-reject filter in the frequency domain and explain its use in periodic noise removal.	(13)	CO3	BTL4	Analyzing
7.	Explain adaptive filters with equations. How do they perform better than standard filters?	(13)	CO3	BTL3	Applying
8.	Explain Wiener filtering in detail. Derive the filter and show how it handles noise and blurring.	(13)	CO3	BTL3	Applying
9.	Design a restoration method using frequency domain filtering to Remove motion blur.	(13)	CO3	BTL4	Analyzing
10.	How are mean filters implemented in the spatial domain? Discuss their effect on Gaussian and salt-pepper noise.	(13)	CO3	BTL3	Applying
11.	Derive a Wiener filter for image restoration and specify its advantages over the inverse filter.	(13)	CO3	BTL4	Analyzing
12.	Describe constrained least squares filtering for image restoration and derive its transfer function.	(13)	CO3	BTL4	Analyzing
13.	Explain the algorithm for the following filtering (i)Adaptive filtering, (ii)LMS filter.	(7) (6)	CO3	BTL3	Applying
14.	(i) What does the term Order statistics filter mean? Classify it. (ii) Elaborate on the operations of the order statistic filter.	(4) (9)	CO3	BTL4	Analyzing
15.	Describe inverse filtering for the removal of blur caused by any motion, and describe how it restores the image.	(13)	CO3	BTL3	Applying
16.	Analyze the characteristics and design of band-pass filters for image restoration.	(13)	CO3	BTL4	Analyzing
17.	Derive the expression for Optimum notch filtering.	(13)	CO3	BTL4	Analyzing

PART-C

Q.No	Questions	Mark	CO	BT Level	Competence
1.	Explain the use of the Wiener filter or the least mean square filter in image restoration.	(15)	CO3	BTL3	Applying

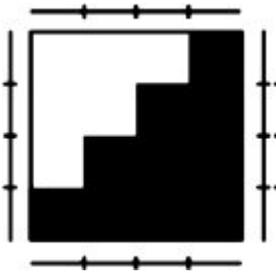|					
2.	Elaborate on Inverse filtering with necessary illustrations.	(15)	CO3	BTL4	Analyzing
3.	Discuss the frequency domain restoration filters in detail, accompanied by necessary diagrams.	(15)	CO3	BTL4	Analyzing
4.	Classify the spatial filtering techniques, and elaborate on any two categories in detail with suitable expressions.	(15)	CO3	BTL4	Analyzing
5.	Draw the image degradation model, and describe in detail various noise models with appropriate equations.	(15)	CO3	BTL3	Applying

UNIT IV   IMAGE SEGMENTATION

Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Morphological processing- Erosion and Dilation, Segmentation by morphological watersheds – Basic concepts of Dam construction, Watershed segmentation algorithm.

PART A

Q.No	Questions	CO	BT Level	Competence
1.	Define edge detection.	CO4	BTL1	Remembering
2.	What is the role of thresholding in image segmentation?	CO4	BTL1	Remembering
3.	Differentiate between region growing and region splitting.	CO4	BTL2	Understanding
4.	What is the purpose of the Hough Transform in edge linking?	CO4	BTL1	Remembering
5.	Define morphological erosion.	CO4	BTL1	Remembering
6.	List the conditions for a region to grow in region growing segmentation.	CO4	BTL1	Remembering
7.	List the three types of discontinuity in a digital image.	CO4	BTL 1	Remembering
8.	Mention the properties of the second derivative around an edge.	CO4	BTL2	Understanding
9.	Name the different types of derivative filters.	CO4	BTL 1	Remembering
10.	Identify the primary applications of watershed segmentation.	CO4	BTL2	Understanding
11.	Write the Sobel horizontal and vertical edge detection masks.	CO4	BTL2	Understanding
12.	What is meant by object point and background point?	CO4	BTL1	Remembering
13.	Identify the problems in region splitting and merging based on image segmentation.	CO4	BTL2	Understanding
14.	Differentiate between local and global thresholding techniques for image segmentation.	CO4	BTL2	Understanding
15.	Mention the steps involved in region splitting and merging.	CO4	BTL2	Understanding
16.	What is meant by object point and background point?	CO4	BTL1	Remembering
17.	Justify the need of morphological operations in image segmentation.	CO4	BTL2	Understanding
18.	Outline the two types of region-based segmentation.	CO4	BTL2	Understanding

19.	Examine the condition that the partitions in region-based segmentation must satisfy.		CO4	BTL2	Understanding
20.	Write a note on the gradient operator.		CO4	BTL 1	Remembering
21.	Outline the three points used in the concept of watersheds in segmentation.		CO4	BTL 1	Remembering
22.	Summarize the challenges in segmentation using morphological watersheds.		CO4	BTL2	Understanding
23.	Differentiate between internal and external boundaries in morphological processing.		CO4	BTL2	Understanding
24.	What is dilation in morphological image processing?		CO4	BTL1	Remembering

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PART – B

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1.	Describe edge detection with necessary illustrations and mathematical operators.	(13)	CO4	BTL3	Applying
2.	Explain the various edge detection techniques, along with suitable examples.	(13)	CO4	BTL3	Applying
3.	Analyze the edge linking methods using the Hough Transform with an appropriate algorithm and applications.	(13)	CO4	BTL 4	Analyzing
4.	Describe thresholding techniques for image segmentation. Differentiate between global, adaptive, and local thresholding.	(13)	CO4	BTL 4	Analyzing
5.	(i) With neat diagrams, explain the steps involved in watershed segmentation. (ii) Point out the features of Catchment basins and divide lines in the watershed algorithm.	(7) (6)	CO4	BTL 4	Analyzing
6.	For the image shown in the figure below, perform segmentation using the split-and-merge technique.	(13)	CO4	BTL 4	Analyzing
7.	Explain the mathematical morphology approach for image segmentation and highlight its advantages.	(13)	CO4	BTL 4	Analyzing
8.	Design an image segmentation system using morphological watershed and explain how markers improve the result.	(13)	CO4	BTL 4	Analyzing
9.	Determine the performance of different edge detectors (Sobel, Prewitt, Canny) in detecting fine edges.	(13)	CO4	BTL 4	Analyzing

Q.No	Questions	Mark		BT Level	Competence
10.	Apply the watershed segmentation algorithm to a sample image and interpret the result.	(13)	CO4	BTL 4	Analyzing
11.	Write short notes on: (i) Edge Linking (ii) Boundary Detection	(7) (6)	CO4	BTL3	Applying
12.	With suitable examples, explain the region splitting and merging technique.	(13)	CO4	BTL3	Applying
13.	Outline in detail the following: (i) Edge linking and boundary detection using local processing (ii) Global processing via Hough transform	(7) (6)	CO4	BTL3	Applying
14.	Examine the Morphological watersheds in segmentation in detail, accompanied by necessary illustrations.	(13)	CO4	BTL3	Applying
15.	Elaborate on the following terms (i) Region Splitting and merging. (ii) Erosion and Dilation.	(7) (6)	CO4	BTL 4	Analyzing
16.	Define thresholding and explain the various methods of thresholding in detail.	(13)	CO4	BTL3	Applying
17.	How is a line detected in an image? Describe with suitable operators The detection of horizontal, vertical, and lines at ±45 degrees.	(13)	CO4	BTL4	Analyzing

PART-C

Q.No	Questions	Mark		BT Level	Competence
1.	Describe region-based image segmentation techniques with necessary diagrams.	(15)	CO4	BTL4	Analyzing
2.	Analyze the following in detail: (i) Detection of Discontinuity in an image (ii) Detection of similarity using region-based techniques.	(8) (7)	CO4	BTL4	Analyzing
3.	Explain in detail about the following: (i) Edge Linking and Boundary Detection. (ii) Global processing via the Hough Transform	(8) (7)	CO4	BTL3	Applying
4.	(i) Write in detail about the role of illumination in thresholding. (ii) With necessary illustrations, explain Basic adaptive and optimal global thresholding.	(5) (10)	CO4	BTL3	Applying
5.	(i) Explain the watershed algorithm with the necessary fundamentals. (ii) Write in detail the Application of Markers in segmentation.	(10) (5)	CO4	BTL3	Applying

	UNIT V IMAGE REPRESENTATION AND RECOGNITION

| | Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching. |

	PART A			
Q.No	Questions	CO	BT Level	Competence
1.	What is data compression?	CO5	BTL1	Remembering
2.	State the need for image compression in multimedia systems.	CO5	BTL1	Remembering
3.	What is Huffman coding?	CO5	BTL1	Remembering
4.	Define Run Length Encoding (RLE).	CO5	BTL1	Remembering
5.	Mention any two advantages of Huffman coding.	CO5	BTL2	Understanding
6.	Differentiate between lossless and lossy compression.	CO5	BTL2	Understanding
7.	What are shift codes in data compression?	CO5	BTL1	Remembering
8.	Define JPEG. What type of compression does it use?	CO5	BTL1	Remembering
9.	What is MPEG and how is it different from JPEG?	CO5	BTL2	Understanding
10.	State the boundary representation in the image description.	CO5	BTL1	Remembering
11.	Summarize the texture in the context of image analysis.	CO5	BTL2	Understanding
12.	Mention the patterns in pattern recognition.	CO5	BTL2	Understanding
13.	What are pattern classes? Give one example.	CO5	BTL1	Remembering
14.	List any two applications of pattern recognition.	CO5	BTL1	Remembering
15.	Define the length of a boundary.	CO5	BTL 1	Remembering
16.	Outline the boundary descriptors.	CO5	BTL2	Understanding
17.	State the description of the Fourier descriptors.	CO5	BTL 1	Remembering
18.	Categorize the types of regional descriptors.	CO5	BTL2	Understanding
19.	List the Topological features.	CO5	BTL 1	Remembering
20.	Define and explain gray-level co-occurrence matrix	CO5	BTL 2	Understanding
21.	Mention about the pattern and the pattern class	CO5	BTL 2	Understanding
22.	Compare the training pattern and the training set.	CO5	BTL 2	Understanding
23.	Point out the difference between the structural and spectral approaches.	CO5	BTL 2	Understanding
24.	What is recognition based on matching?	CO5	BTL 2	Understanding

	PART-B				
1.	Explain in detail the need for data compression and classify various compression techniques.	(13)	CO5	BTL3	Applying
2.	Describe the steps of the Huffman coding algorithm with a suitable example.	(13)	CO5	BTL3	Applying
3.	Illustrate the working of shift codes and their role in data compression. Provide suitable examples.	(13)	CO5	BTL3	Applying
4.	Elaborate arithmetic coding technique. Compare it with Huffman coding in terms of efficiency.	(13)	CO5	BTL4	Analyzing

5.	Analyze the JPEG compression standard. Explain DCT and quantization steps in detail.	(13)	CO5	BTL4	Analyzing
6.	Elaborate MPEG compression techniques and how temporal redundancy is handled.	(13)	CO5	BTL4	Analyzing
7.	Describe various boundary representation techniques. Explain chain codes and polygonal approximation.	(13)	CO5	BTL3	Applying
8.	Describe regional descriptors. Explain topological and statistical features with examples.	(13)	CO5	BTL3	Applying
9.	Explain texture analysis and discuss any two statistical methods used to describe texture.	(13)	CO5	BTL3	Applying
10.	Illustrate the steps involved in pattern recognition based on matching.	(13)	CO5	BTL3	Applying
11.	With neat diagrams, explain different types of pattern classes and classification techniques.	(13)	CO5	BTL3	Applying
12.	Interpret a comparative study of Huffman, RLE, Arithmetic Coding, JPEG, and MPEG in terms of compression ratio and quality.	(13)	CO5	BTL4	Analyzing
13.	(i)Distinguish between lossless and lossy compression. (ii) Categorize the image compression standard along with its block diagram.	(7) (6)	CO5	BTL4	Analyzing
14.	Explain i) The different approaches to textures ii) the parameters of descriptors in image representation.	(7) (6)	CO5	BTL3	Applying
15.	Determine the Huffman code and average length of the code, and its redundancy for the source emits letters from an alphabet A= {a1, a2, a3, a4, a5} with probabilities $P(a1) ==0.2$, $P(a2) =0.4$, $P(a3) =0.2$, $P(a4) =0.1$ and $P(a5) =0.1$.	(13)	CO5	BTL4	Analyzing
16.	Analyze a coder which a source emits letters from an alphabet A= {k1, k2, k3, k4, k5} with probabilities $P(k1) =p(k3) =0.2$, $P(k2) =0.4$, $P(k4) = P(k5) =0.1$, entropy = 2.122bits/symbol. Find Huffman code for this source and the average length of the code and its redundancy.	(13)	CO5	BTL4	Analyzing
17.	(i)Summarize the decision-theoretic methods for recognition. (ii)Analyze about the recognition based on matching method with equations.	(7) (6)	CO5	BTL4	Analyzing

	PART – C				
1.	What is image compression? Explain any four variable length coding compression schemes.	(15)	CO5	BTL 3	Applying

2.	Elaborate about the various boundary descriptors in detail with neat diagram.	(15)	CO5	BTL 4	Analyzing

3.	Summarize on the following image representation technique
	    i) Chain code
	    ii) Polygonal approximation.
		(8)
		(7)
			CO5	BTL 3	Applying

4.	Analyze the different techniques for the representation of shapes in digital image. Explain the principle behind "Fourier Descriptor" based shape representation.	(15)	CO5	BTL 4	Analyzing
5.	Describe the block diagram of MPEG encoder and discuss its operation.	(15)	CO5	BTL 3	Applying